

**Proposed Title 5 Permit Modification for
Copper Calciner 1 P006
Elyria, OH Site**

22-Apr-2016



DATE

Proposed Modification for P006

This proposal covers Title 5 permitting requirements around a specific product family that will be processed in P006.

The recommended permit modification is as follows:

- Add NOX to the contaminant list @ < 10 lb / day
- Adjust equipment discharge rate limit to 350 lb / h max

DATE

Methodology and Calculation

To ensure compliance <10 lb NO_x / day, operating limits are derived using the calculation below. The methodology of the derivation is as follows:

1. Actual NO_x emission data was produced and reported by ERM.
2. The average nitrate (NO₃) content of the precursor feed is measured by Elyria QC.
3. NO₃ → NO_x conversion factor is calculated from these values. For the product family that will be processed in P006, the conversion is 5.9%.
4. Process variables that affect NO_x emission are: %NO₃ & %LOI (loss on ignition) of the feed and calciner discharge rate.
 - %NO₃ and %LOI are controlled in an upstream process to a maximum of 2.0% NO₃ and 25% LOI.
 - Maximum discharge rate would be limited to 350 lb / day, based on the maximum NO₃ and LOI limits of the feed.

$$\text{Max. Discharge Rate, lb/h} = \frac{9.9 \text{ lb NO}_x/\text{day} * (1 - \%LOI_{@cal.temp})}{24 \frac{h}{day} * \%NO_3 * \%conversion * \frac{46 \text{ g NO}_x/\text{mol NO}_x}{62 \text{ g NO}_3/\text{mol NO}_3}}$$

DATE

NO_x Generation vs. Discharge Rate

At maximum values of 2.0% NO₃ and 25% LOI on the feed, this table compares the calculated NO_x rate @ various calciner discharge rates (5.9% NO₃ -> NO_x conversion).

NO _x [lb / day]	Discharge Rate [lb / h]
9.0	321
9.1	325
9.2	328
9.3	332
9.4	336
9.5	339
9.6	343
9.7	346
9.8	350
9.9	353

DATE